"the packet"

The newsletter of V.A.D.C.G.

The Vancouver Amateur Digital Communications Group

ISSUE 8 OCTOBER 1983

I-FRAME de VE3PKT

.---. -.- -

Newsletter of the

HAMILTON & AREA PACKET NETWORK

CONTENTS

Vancouver Amateur Digital Communications Group
9531 Odlin Road, Richmond, B.C., Canada V6X 1E1

MESSAGE FROM THE EDITOR

By Doug Lockhart, VE7APU

Once again we have a new editor for "the packet". It always seems difficult to hold onto a good editor for more than one issue. Many of the articles in this issue have to do with activities in the Toronto/Hamilton area because that is where yours truly is living at the present time.

I have been living in Toronto for two years now and I currently have the call, VE3OGY but soon I will be moving back to VE7 land and will reassume the call I had before. I am assured by the DOC that I will be able to get my old call back - VE7APU.

I have enjoyed my period here and my dealings with the active packeteers in this area. I hope I have been able to contribute to the growth of the packet activities in the Toronto/Hamilton area and I will certainly try to maintain contact with the friends I have made in this area after I return to the west coast. But, to be honest, I am slightly homesick for my friends and relatives in the Vancouver area and that is one of the reasons I am going back. After resettling on the west coast, I plan to be more active in packet radio than I have been recently.

****

REORGANISATION

Well, I expect everyone has been anxiously awaiting another issue of "the packet" and wondering why it has been such a long time in coming. The problem has been a lack of volunteer labour in the Vancouver area. We had just plain tried to bite off more than we could chew. To remedy this situation, the VADCG temporarily shifted its base of operations from the Vancouver area to the Toronto area. There was more volunteer labour available in Toronto to follow up on the Group's activities and committments.

This change has helped the Vancouver area individuals to get some burdensome tasks off their backs and give them an opportunity to regroup. They have been doing a terrific job but it was time to give them a rest. The reorganisation has caused some disruption in the Group's activities and I'm sure that some individuals have been inconvenienced by slow response to letters and orders. We would like to apologize to anyone inconvenienced in this way. However, at the present time all orders have been filled and most letters have been answered.

The Group is now transferring activity back to the Vancouver area which will cause some more temporary disruption in activity but it is expected that things will sort themselves out in a couple of months.

The new address of the VADCG will be:

VADCG
9531 Odlin Road
Richmond, B.C. V6X 1E1

Don Oliver, VE7AOG has retired from the position of Secretary/Treasurer of the group after serving over two years in this demanding position. Thanks for your devoted and sustained effort Don! Don's position has been taken over by Doug Lockhart, VE7APU whose home address will be as above. John Spraggs, VE7ADE is staying on as President.

The changes in address of the Group may be confusing but all correspondence addressed to the old addresses of the Group will eventually reach the proper destination. The address above will become effective in November when the new secretary/treasurer relocates back to the Vancouver area.

****

H.A.P.N. GETS NEW SECRETARY

The Hamilton and Area Packet Network has a new secretary and a new address. Ron Hands, VE3SP is taking over this position from Stu Beal, VE3MWM who has been secretary since the group started. I'm sure I speak for everyone when I thank Stu for his excellent work in this position over the last few years. Thanks to Ron as well for volunteering to take over this position.

The new mailing address is:

H.A.P.N.
8 Forestgate Drive
Hamilton, Ont. L9C 6A3

****

MEMBERSHIP/NEWSLETTER POLICY

The VADCG has never been able to publish the newsletter on a regular basis and that situation is not likely to change. Notwithstanding any information to the contrary, a subscription to the newsletter is for an indefinite period of time - not necessarily for one year only. The number of issues received is a better measure of the extent of the subscription. Any money received for membership is taken as a donation to the VADCG. Some of these funds are used to develop new hardware and techniques for Amateur Packet Radio and some will be used to disseminate information. So far, no one who has ever made a donation has been removed from the membership/mailing list. If this becomes necessary, notification will be sent out in advance to those involved.

At the present time we are asking for a donation of $10 from new members who live farther than 100 kilometres from the centre of activity of the VADCG and for $15 for those able to attend meetings of the VADCG and directly participate in the Group's activities. Of course, any additional donations are gratefully accepted.

The newsletter is really the only way the Group has of communicating to the many users of the VADCG TNCs and the VADCG modems. If you have any information regarding hardware or software for these

boards that would be suitable for inclusion in the newsletter we would appreciate receiving it. For that matter, we are soliciting any material that you think would be suitable for the newsletter. Our current policy however, is not to financially compensate the authors of newsletter articles.

****

PACKET RADIO ACTIVITY IN THE HAMILTON-TORONTO AREA

Since many of those readers on the VADCG mailing list may not have heard of the Hamilton and Area Packet Network or of the Amateur Packet Radio activities in the Toronto area I will give a little background information about the area and the organisation. I have been living in Toronto for almost two years now.

Toronto and Hamilton are located on the northwest shore of Lake Ontario about 60 miles apart and are within two metre range of each other as well as Buffalo, New York. Interest in Packet Radio took hold in the area in the fall of 1979 after a talk on the subject by yours truly at a meeting of the Hamilton Amateur Radio Club. Prior to the talk there had been some communication with the Vancouver Amateur Digital Communications Group. Some of the pioneers of this mode of communication in that period were John Vandenberg - VE3DVV, Glenn Simpson - VE3DSP, Max Pizzolato - VE3DNM, Stewart Beal - VE3MWM and others.

In 1980 Stewart Beal organised the Hamilton and Area Packet Network and almost single-handedly published a series of very informative newsletters mostly distributed locally.

In the intervening years, interest in packet radio increased and now the small group in the Hamilton area has expanded to include Toronto, the area between Toronto and Hamilton and other areas in southern Ontario. The numbers of active 'packeteers' in the area has grown to about 50 who can and do go on the air regularly on packet. There are at least as many more who are in some stage of getting something on the air. To my knowledge, this is the largest group of active 'packeteers' anywhere.

In spite of distance, there has been a continuous history of communication and cooperation with the VADCG during the development of packet radio in this area so it is not surprising that the two groups put out this combined newsletter. All the activity in this area involves the use of the VADCG TNC and the 'Vancouver' protocol. There have been a number of unique and useful programs for the VADCG TNC developed in this area.

At the present time, the area has a digital repeater in operation and a second one under construction which when completed will provide a link to a third repeater located in Rochester, New York. There is also a remote CP/M system and RBBS operating on the local network. There is also development work going on in this area. Individuals in this area are developing techniques to use the special service channels on Oscar 10, protocols for multiple links, a high speed packet radio, higher level protocols, intelligent repeaters and other projects. Only time will tell which of these projects will yield significant results.

There is a weekly packet radio net on one of the local 'analog' repeaters. Two simplex channels - 145.65 MHz. and 146.46 MHz. are used almost exclusively for packet radio communications but there is sometimes so much activity on 145.65 that it is necessary to use a second frequency for packet. The Toronto-Hamilton group may not be high-profile but it is certainly one of the largest and most active packet radio groups.

********* 1968

PACKET RADIO CONFERENCE PROCEEDINGS

I attended the Second ARRL Amateur Radio Computer Networking Conference in San Francisco last March 19. Although the weather did not cooperate, it turned out to be a very useful conference. The conference was held at the same time and place as the West Coast Computer Faire and so it was possible for me to take in both events. I delivered one of the papers at the conference and attended a meeting of the ARRL Committee on Amateur Digital Communications while I was there.

The conference was very useful in that it permitted many of the most active people in Amateur Packet Radio to meet and talk with one another. These individuals are widely scattered geographically and rarely have an opportunity to communicate efficiently with one another. Many scattered groups are doing their own thing very isolated from other groups. The 'eyeball' QSOs tend to get the groups going in similar directions. But perhaps the most useful thing to come out of the conference was the Conference Proceedings. This is a bound volume of 16 papers which were prepared and submitted for the Conference. I recommend them to all those interested in Amateur Packet Radio. The different papers offer a wide perspective of ideas on the subject.

The good news is that they are still available. They may be obtained by sending a cheque payable in U.S. funds addressed to: American Radio Relay League, 2nd Packet Conference Proceedings, Newington, CT 06111. The price is $9.00 each for up to 9 copies or $6.75 each if you order 10 or more copies. The price again drops to only $6.00 per copy if you order more than 50 copies.

****

VARIOUS TIPS FROM THE SCHOOL OF HARD KNOCKS

by John Langtry, VE3NEC

(Editor's comments - the following tips from John come from his experience in interfacing the VADCG TNC board to a Radio

Shack computer. They may be helpful to others bringing up the VADCG board.)

1) Master Clock Stability. This is a reminder that if the Node either fails to work initally or after subsequent power ups, that two small capacitors 20 pf should be added, one from each side of the crystal to ground.

2) Using TRS-80 Mod III & IV. This problem only occurs where either all 25 leads are connected from the R/S port to the Node or where ribbon cable is used. The problem stems from the fact that R/S grounds all unused leads from the RS-232 port which will result in a dead Node. The solution is to open pin 17 in the cable or to cut the track closest to pin 40 of the 8255's empty socket. This track runs parallel to the end of that socket, on the top side of the board, and is about 0.5 inch long and terminates with plated through holes.

3) The Trap Lead. This is another reminder that the trap lead is held low by a track from conection point "D" to ground. If you intend to use the trap function, cut this shorting track. The track is found on the bottom side of the board connecting points "B" and "D", about 3/8 of an inch long and is thinner than other leads in this area.

4) Disconnecting. This is an operational error which will cause two nodes to perpetually "ping-pong" data back and forth. The problem occurs when you release your last frame and then disconnect before the other station acknowledges the last transmission. Wait a second or two before disconnecting to be sure your Node has recognised the 'ACK' of the last transmission.

****

MORE TIPS

The H.A.P.N. has collected information which may be helpful for testing a Radio Packet Station.

Power Supply :
01) Check power supply to be free of oscillations, to have the proper voltages, sufficient current and regulation.

T.N.C. :
02) Power TNC board (without chips) ; check voltages at each socket , and if OK : insert chips. RE-check voltages at each socket.
03) SCOPE pin 2 of J2 : it should show the FLAG. Push RESET : the FLAG may change level.
04) METER pin 15 of J3 :it should read greater than +3 volts; push RESET :it should read smaller then -3 volts.
05) METER pin 3 of J2 : it should read greater than +3 volts.
06) METER pin 4 of J2 : it should read smaller than -3 volts.
07) METER pin 5 of J2 : it should read smaller than -3 volts.
08) METER pin 6 of J2 : it should read greater than +3 volts.
09) METER pin 8 of J2 : it should read smaller than -3 volts. Open SQUELCH : it should read greater then +3 volts.
10) Set TNC baud rate dip switch to desired speed.

MODEM :
11) Power MODEM board (without chips); check voltages at each socket and if OK : insert chips.
RE-check voltages at each socket.
12) METER PTT line : on Rx it should read greater than 3 volts ;on Tx it should read smaller then -.3 volts.
13) CHECK frequencies (f1) pin 7 ; (f2) pin 8 of XR 2206: if pin 9 is open circuited or connected to a bias voltage greater than +2 volts ,only R1 is active. Similarly ,if the voltage level at pin 9 is smaller then 1 volt, only R2 is activated.
14) CHECK frequency at pin 1 of 4024 : it should be equal to MHZ 2.4576 (1/2 xtal frequency).
15) Set Rx AUDIO at (XR 2211) pin 2 using to 3V rms.
16) Connect a jumper from Tx audio out to Rx audio in ; SCOPE pin 9 of XR 2206 and pin 7 of XR 2211 : they should look alike ; if they don't : adjust the 10K pot at pin 12 of XR 2211. REMOVE jumper.
17) Set MODULATION to approximate 3 KHZ.

****

REQUEST FOR PROGRAMS

There have been a great many programs written for the VADCG TNC and also for various common microcomputers interfacing with it. From observation it appears that in each area that the board is used in only a few of these programs are well known. I know that many programs for the board have been written in this area but are unknown in other areas.

The VADCG will be creating a software library of all the programs it can find for the board and also intends to publish a short summary on each program in the library in forthcoming newsletters. Arrangements will also be made for distribution of diskettes and perhaps a telephone-based BBS system with the programs being online. At present we have about four CP/M diskettes full of programs for the TNC itself and some others for various other microcomputers. We know that this is only a small part of the software written for the board. If you have any programs for the board which you have reason to believe we do not have then please send them to the VADCG address. We will pay your expenses in getting them to us if required.

Members of the VADCG in Vancouver wrote the original software and protocols for the VADCG board and distributed it freely far and wide. Most of the software for the board today (as well as some other packet boards) is based on that original pioneering work. The VADCG would appreciate it if others would return the favour and send their software for the board to us. This centralization and cataloguing of the software will help everyone using the board.

PACKET RADIO IN AUSTRALIA

"Yes, packet radio is alive and well and resident in Australia!" proclaims the first line of Volume 1 Issue 1 of "THE AUSTRALIAN PACKETEER" - the newsletter of the Sydney Amateur Digital Communications Group. The first newsletter of this informal group was published in May, 1983 and the following is an excerpt from that publication describing the present state of packet radio in the Sydney area at that time:

The present local area network (LAN) consists of four fully operational stations:

VK2BVD	French's Forest	Sydney
VK2KFJ	Beaconhill	Sydney
VK2ZJO	Dee Why Portable	Sydney
VK2ZXQ	Gosford	

communicating on 2 metres:

147.600	TDM digital repeaters
147.575	liason and direct terminal-to-terminal packets

Other stations nearing completion are:

VK2ZRQ	Berowra	Sydney
VK2ZLV	Gosford	
VK2XAD	Kirrawee	Sydney

For the Sydney stations to reach Gosford, VK2KFJ has also been doubling as a "digital" repeater.
Network protocol is determined by VADCG Terminal Node Controllers ("TNC boards) operating through 1200 baud VADCG AFSK radio modems.

Present network resources include a digital repeater and a CP/M Community Bulletin Board Service operated by VK2ZXQ.

Special thanks must go to the Vancouver Amateur Digital Communications Group for provision of the controller boards and software, to Doug Lockhart VE7APU and John Vandenberg VE3DVV for provision of the digital repeater software, and to Stu Beal VE3MWM for the bulletin board software.

Thanks also to the Amrad Group: Paul Rinaldo W4RI, Dave Borden K8MMO, et al. for comments and encouragement.

BACKGROUND

VK2BVD (as VE7ABH) became involved in the early discussions on packet radio in late 1978 in Vancouver but it was not until October '82 that sufficient interest developed locally to establish a network in Sydney.

Construction of TNC's commenced with two systems operating in beacon mode at Gosford Field Day: 20 February 1983. The following Friday VK2KFJ and VK2ZXQ exchanged packets via a test repeater trial. Following resolution of a technical problem (partly faulty WD8250), VK2BVD was up and running a week later.

Earlier that week the digital repeater software arrived from VE3DVV and PROMs were zapped. First tests on Saturday 9 April from VK2BVD with VK2KFJ operating as a digital repeater were conducted successfully to great excitement. The following day 2-way packets were exchanged between VK2ZXQ and VK2BVD via VK2KFJ as the repeater. This became the only mode of contact between VK2BVD and VK2ZXQ as there is no VHF circuit between the two locations, either direct or repeatered.

Shortly thereafter, VK2ZJO joined the group. A packet radio demo was given at the regular Manly-Warringah Radio Society meeting on 20 April with VK2ZJO remotely demonstrating repeater capabilities from his home to equipment at the club.

Over the next month, miscellaneous audio level standards evolved, RFI problems eliminated, frequencies established, RF paths improved, and cabling completed, etc.

Finallly, the real potential of digital communications was relaized on May 20 when VK2BVD was able to access the VK2ZXQ CP/M computer system via VK2KFJ and operate as an interactive remote terminal for over two hours.

WHAT NEXT?

Evolution of the 'OZPAC' net continues:
-on 21 May VK2ZXQ established a CP/M packet radio Community Bulletin Board into service using local and VE3MWM software.
-exisitng stations with "dumb" terminals are inserting local computers into the loop.
-a permanent digital repeater VK2ZRQ/R has been tested.
-HF liason with W9JD, W4RI and others for HF protocol and modem tests.

The Sydney Amateur Digital Communications Group is an informal group of packet radio/computer enthusiasts. Enquiries may be directed to any participant or to:
Jim Swetlikoe VK2BVD 8 Prahran Avenue, French's Forest NSW 2086.

(Editor's notes - Since this newsletter was published several more packet stations have become active in the Sydney area. The members of VADCG and HAPN wish the new group in Sydney every success and congratulate them on so much progress in so short a time. I personally remember Jim Swetlikoe when he was VE7ABH sitting in at the many meetings of the VADCG in the living room of my house in Vancouver.)

****

COMBINED NEWSLETTER

This newsletter is going out to members of the VADCG and also to members of HAPN - the Hamilton and Area Packet Network. Both of these groups have had difficulty in getting out regular newsletters and we hope to be killing two birds with one stone in combining our newsletters. The mailing lists of both organizations have been combined for this issue.

****

ROCHESTER HAMFEST

Several 'Packeteers' from the Toronto, Hamilton and Rochester areas cooperated this summer to set up a packet radio demonstration at the Rochester Hamfest. A portable digital repeater brought from Canada was temporarily set up at Kodak Park in downtown Rochester to provide a good signal into the Hamfest site south of the city. A couple of fully operational packet stations were set up at booths inside the domed arena at the Hamfest site.

The amazing thing about the operation is that Murphy stayed far away - even the weather was perfect. The repeater and all the equipment operated flawlessly. The packet stations at the Hamfest were able to work packet stations on the Canadian side of Lake Ontario using only handy-talky transceivers and rubber ducky antennas.

The packet radio booths were very well attended and a great deal of interest in packet radio in the Rochester area was generated by the exhibit. In addition to this demonstration, a talk on packet radio was given by Gordon Beattie, N2DSY which was also well attended and further heightened interest in this mode.

I am writing this report more than two months after the event and there has been much increased activity in packet radio in the Rochester area. There is a small group of packeteers now in Rochester and they have put up a digital repeater of their own which can occasionally be worked by individuals in the Toronto-Hamilton area when propagation conditions are favourable. To find out the latest information on packet radio activities in the Rochester area I suggest contacting Ray Williams, WA2RYT whose address is: 305 Barry Road, Rochester, N.Y. 14617 (Tel. (716) 338-2789)

****

REPEATER LINKING PROJECT

By Doug Lockhart, VE7APU

During the Rochester Hamfest this summer a number of interested packet radio enthusiasts in the upstate New York and the Toronto-Hamilton area discussed the possibility and practicality of setting up a chain of interlinked digital repeaters extending from Toronto, Ontario to Albany, New York which would eventually allow linking into another proposed digital repeater chain running up and down the east coast of the U.S. At the time there was only one digital repeater operating in the entire area and the project presented a lot of difficulties. In spite of some obviously apparent problems there was a lot of interest expressed in proceeding with the idea.

A couple of weeks after the Hamfest, I took a trip along the route of the proposed repeater chain to help coordinate the project and to obtain commitments to set up the various repeater sites required. As a result of the trip seven within two metre range of each other were identified and committments were obtained for the establishment of six of them. The seven sites going from west to east are:

1. Erin Mills, Ontario (between Toronto and Hamilton)
2. Bowmanville, Ontario (East of Toronto)
3. Newark, New York (East of Rochester)
4. Syracuse, New York
5. Ilion, New York (Utica-Rome area)
6. Schenectady, New York
7. Hudson, New York

If the project succeeds, packet stations as far apart as Hamilton, Ontario and New York city should be able to communicate using these 7 repeaters. At the present time, however, no committment from any group in Syracuse, New York has been obtained. This means that an important element in the chain is still missing. If anyone is interested in setting up this 'missing link' in Syracuse please write to John Vandenberg at the address of the H.A.P.N. The group in Toronto will do all they can to assist in the establishment of the digital repeater in the Syracuse area.

The following are the names and addresses of individuals associated with the establishment of repeaters at the various sites:

Site #1
Bruce Cowan, VE3GBC, 165 La Rose Ave., Apt. 906, Weston, Ont.
Site #2
John Vandenberg, VE3DVV, R.R. 2, Mount Hope, Ont. L0R 1W0
Site #3
Ray Williams, WA2RYT, 305 Barry Road, Rochester, N.Y. 14617
Tom VanBuskirk, NA2D, R.D. 1, Phelps, N.Y. 14532
Site #4
Nobody!
Site #5
Angelo Tsiatsos, WB2NSU, 2 Vosburg Street, Ilion, N.Y. 13357
Vince Staffo, WB2FYZ, 10 Monroe Street, Ilion, N.Y. 13357
Site #6
Bill Patmos, W2DHT, 1054 Maryland Avenue, Schenectady, N.Y.
Howard Lester, W2ODC, P.O. Box 6, Alplaus, N.Y. 12008
Gil Porter, W1GP, 1322 Stratford Rd., Schenectady, N.Y. 12308
7. Site #7
Julius Madey, R.D. 2 Box 390, Hillsdale, N.Y. 12529
Jim Hendricks, RFD #1, Stuyvesant, N.Y. 12173

To my knowledge this is the first time such a digital repeater link-up has been attempted and it will take a while before we can get it going. Software to make the repeaters work together has to be developed and debugged. The major problem we have however, is poor communication between the various groups involved. They are separated geographically and are not all within two metre range of each other. We may have to use the 40 metre or 75 metre bands to communicate and coordinate this very ambitious project.

I will provide another progress report in a subsequent newsletter.

TNC ENGINEERING CHANGES

By Doug Lockhart,* VE7APU

Back in issue number 4 of "the packet" there was an article which described some useful changes that could be made on the VADCG TNC board to add additional function. Since then other modifications have been developed. What follows is a step by step procedure to modify the board to incorporate these changes. Many users of the board may not have seen the original changes in issue number 4 so it is appropriate to re-publish this information in this different form.

In the intervening period, these modifications have become much more important because a lot of useful software has been written relying on these changes. In fact, these modifications are so important that I would recommend them to anyone using the board. In a forthcoming issue of "the packet" we will be publishing listings of programs using these modifications.

The following engineering change adds the following hardware functions to the board:

1. A debounced pushbutton controlling the TRAP line on the 8085. This provides the opportunity to obtain accurate snapshot dumps of unusual conditions in the TNC hardware or software and allows downline loading of the TNC. The complete status of the board may be saved including register contents and the value of the program counter.
2. A pushbutton controlling the RESET line on the 8085. (Most users have already installed this feature.)
3. A status indicator LED which can be controlled by software running in the TNC.
4. A precise timing pulse generated from the AC mains frequency which can be read by the software in the TNC and can also be used to provide timed interrupts for use by a software time-of-day clock or interval timer for accurate time-outs and clear to send delay generation.

Note that these modifications use an area of the board that is normally used for components to support a 20 ma. current loop interface. If you are using the 20 ma. current loop interface then this engineering change will not fit on your board. You will have to design your own modifications to provide these new functions. If you have installed the components for the 20 ma. current loop interface but are not using it, then you should remove CR2, CR3, R17, R18 and Q1.

PARTS REQUIRED:

74LS00 or 7400 integrated circuit
14-pin DIP socket (solder tail)
12,000 Ohm 1/4 watt resistor
3.9 to 4.7 Volt Zener diode 1/2 watt
2N3904 NPN transistor (or equivalent)
LED with wire leads (any colour)
100 Ohm 1/4 watt resistor
2 normally open pushbuttons
About 5 feet of #30 or #28 wire-wrap wire

TOOLS AND MATERIALS REQUIRED:

Small soldering iron.

Wire stripper.

Exacto knife or equivalent to cut land patterns on the PC board.

A #60 or smaller diameter drill bit.

A small drill to hold above bit.

The original TNC 'Assembly Notes'.

Contact cement (optional).

PROCEDURE

Step 1.

Make four (4) cuts in the land pattern connections on the back of the board. A sharp knife or small grinding wheel is useful to break the land pattern. See figure 1 for the locations of these four cuts.

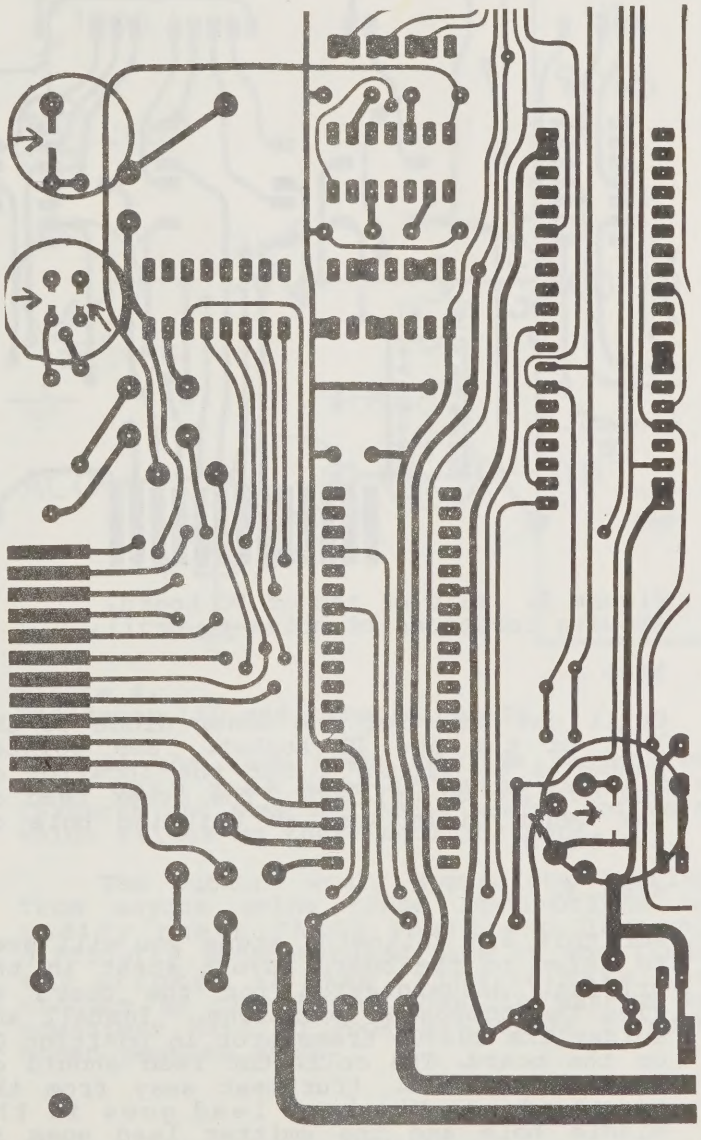

Figure 1. Part of back of PC board. Showing locations of land pattern cuts

Step 2.

Drill 14 holes for the DIP socket. It will be located in the bare area of the board just below socket J3 near the DB-25 modem connector. See pointer number 1 on figure 2 for proper position and orientation of the socket. It is easier to drill these holes if a jig is made up in advance from a scrap piece of pre-drilled PC board or if a stick on 1:1 label is used as a visual guide.

Step 3.

Drill 2 holes for the bypass capacitor just above the socket just installed. The holes should be spaced either .2 or .3 inches apart depending on the lead spacing of the capacitor being used. See pointer number 2 on figure 2 for positioning of these holes.

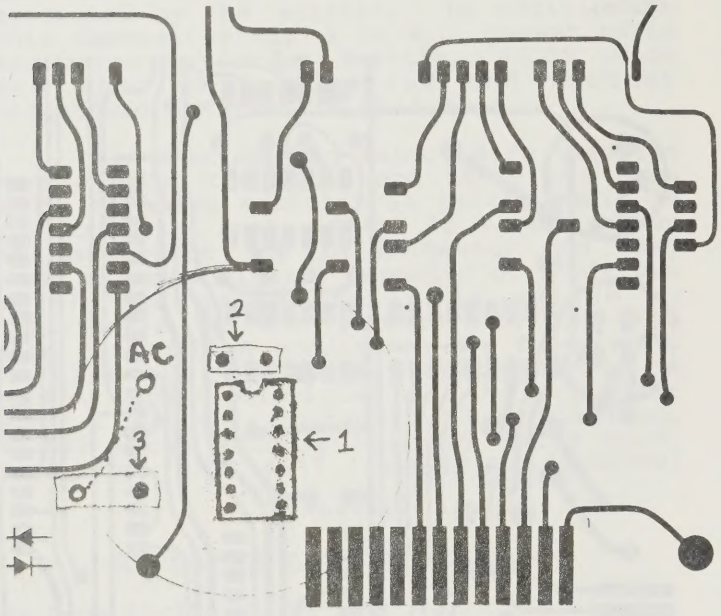

Figure 2. Part of top of PC board. Showing locations of holes to drill.

Step 4.

Drill one hole for the Zener diode to the left of the new IC socket. See pointer number 3 on figure 2 for the location of the hole to be drilled. The other lead of the Zener diode uses an existing hole on the board.

Step 5.

For this and following steps you will need to refer to the board layout sheet in the original documentation for the board to find the component positions. Install and solder the 2N3904 transistor in position Q1 on the board. The collector lead should go in the top hole. (furthest away from the board edge) The base lead goes in the middle hole and the emitter lead goes in the bottom hole (closest to the edge of the board). Do not trim the leads at this time.

Step 6.

Install and solder the 12,000 Ohm resist[illegible] in position R17.

Step 7.

Install and solder the 100 Ohm resistor in position CR2. Do not be concerned that this position was originally for a diode.

Step 8.

Install and solder the LED in position CR3 on the board. Ignore the markings on the board at this position. The cathode of the LED should be oriented towards Q1.

Step 9.

Bend the collector lead of the 2N3904 transistor over and solder it to the cathode lead of the LED. Trim all leads.

Step 10.

Install the 14 pin IC socket in the holes drilled in step 2 above. The socket may be glued in place with contact cement. Pin 1 should be positioned furthest from the board edge.

Step 11.

Install the .1 mfd capacitor in the holes drilled in step 3 above. One lead should be bent over and wrapped around pin 14 of the IC socket (5 Volt level) and soldered. Bend the other lead over and solder it to the land pattern running just above the capacitor. This is a ground line. Trim excess lead length.

Step 12.

Install the Zener diode in the holes in area 3 of figure 2. The anode lead should be put through the right hand hole and bent over to connect with the ground land on the back of the board. The cathode lead is soldered in the already existing hole.

Step 13.

Using the wire wrap wire make connections between the following points on the newly installed socket.
a. Pin 1 and Pin 6.
b. Pins 3, 4 and 5.
c. Pins 9, 10 and 11.
d. Pin 12 and pin 13.

Step 14.

Using the wire wrap wire make connections between the new socket and other points on the board.

a. Pin 14 of the new socket and pin 40 of U3.

b. Pin 14 of the new socket and the 100 [illegible] resistor at CR2. Connect to end closest to Q1.

c. Pin 2 of the new socket and RESET pin A.

d. Pin 6 of the new socket and TRAP pin D.

e. Pin 7 of the new socket and the Ground land pattern. (It is the closest land pattern to the pin.)

f. Pin 8 of the new socket and pin 5 of U1. (This is the SID pin)

g. Pin 12 of the new socket and the cathode of the Zener diode installed in area 3 of figure 2.

Step 15.

Using the wire wrap wire make connections between the following points on the board:

a. Pin 4 of U1 and the 12,000 Ohm resistor at R17. Connect to the end farthest from Q1. There is a convenient pad available for this connection left by the removal of R18.

b. The pad connected to the emitter of the transistor at Q1 and a nearby ground land pattern.

Step 16.

Install the 7400 or 74LS00 IC in the new 14 pin socket.

Step 17.

Mount the two normally open pushbuttons at some convenient location. Connect one pushbutton to RESET pins A and B on the top of the board. This is the reset pushbutton. Connect the other pushbutton to TRAP pins C and D on the top side of the board. This is the trap pushbutton.

Step 18.

Double check the modifications against the schematic diagrams in figures 3 and 4. If everything checks out then the change is now complete.

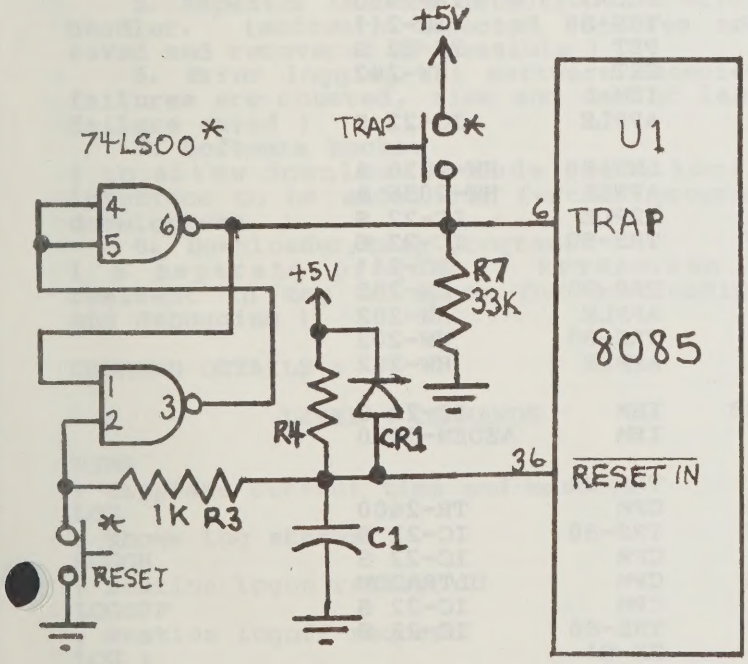

Figure 3.
TRAP and RESET circuit changes.

AC HOOKUP

Take a lead from the secondary of the power transformer and connect it through a resistor to the pad marked 'AC' in figure 2. The value of resistor to be used may be calculated with the following formula:

$$R = 200 (V_{pk} - 5)$$

where V_{pk} is the peak value of the voltage from the transformer. The formula gives the resistance in Ohms.

The resistance value is not at all critical and may be plus or minus 50% from the value given by the formula.

IMPORTANT NOTE: Do not connect to the board without this resistor. Also - do not connect the circuit directly to the AC mains!

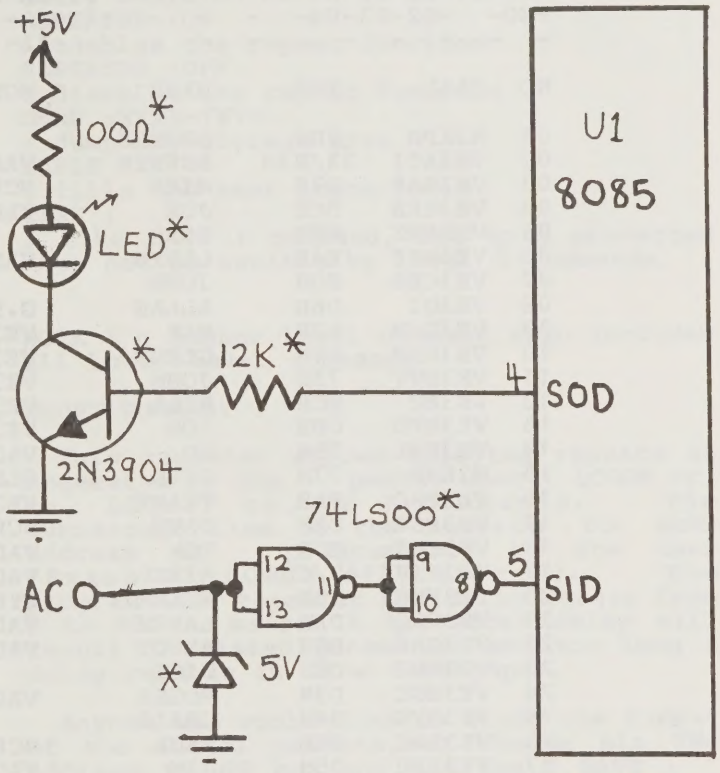

Figure 4.
Indicator LED and timer circuits.

In the next issue of 'the packet' we will show some ways of using these new features and some extremely useful software which relies on these modifications.

The author* would appreciate hearing from anyone using these instructions to modify their VADCG board who has any difficulty understanding them or who finds any errors. I have tried to make the changes as clearly as possible but it is sometimes hard to look at things through other peoples eyes.

* Douglas Lockhart, VE7APU
9531 Odlin Road,
Richmond, B.C. V6X 1E1

TNC ADDRESS ASSIGNMENTS IN THE TORONTO/HAMILTON AREA

The following chart shows the TNC address assignments and other information relating to packet stations in the Toronto/Hamilton area as of August 22, 1983. Certain blocks in the series are reserved for use in other areas which hopefully will be in packet communication with us in the future. (Ed. note: The list is already a bit out of date as of press time.)
T N C NUMBERS 0 ,88H AND FFH ARE NOT TO BE USED.

```
-**-  -  -  -  -  -  -  -08-  -  -  -  -  -  -  -
-  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
-  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
-  -  -  -33-34-35-  -  -  -39-3A-  -  -  -  -  -
-40-41-  -  -44-  -  -  -  -  -  -  -  -  -  -  -
-N E W A R K     ( R O C H E S T E R )        -
-  -61-62-63-  -  -  -  -  -  -  -  -  -  -  -  -
-  -  -  -73-74-75-76-77-78-  -7A-7B-7C-7D-  -  -
-  -  -  -  -84-85-  -  -**-  -  -  -  -  -  -  -
-S  Y  R  A  C  U  S  E / I    L    I    O    N -
-S C H E N E C T A D Y  / H   U   D   S   O   N -
-  -  -  -B3-B4-B5-  -  -  -B9-BA-  -  -  -  -  -
-C0-C1-  -  -C4-  -  -  -C8-  -  -  -  -  -  -  -
-D0-D1-D2-D3-D4-D5-D6-D7-D8-D9-DA-DB-DC-DD-DE-DF-
-E0-  -E2-E3-E4-  -  -  -  -  -  -  -EC-ED-EE-EF-
-  -  -  -  -  -  -  -  -  -  -  -FA-  -  -  -  -**-
```

NO	CALL	TNC	NAME	MODEM	TERM	RIG
01	N2APB	7DH	GEORGE			
02	VE3ATI	33/B3H	BERNIE	VADCG	VCOM1	TR-7950
03	VE2BAR	D7H	MIKE	NCR	LNW-80	XXX
04	VE3BKB	DCH	JON	VADCG	VCOM1	IC-22 S
05	VE3BRZ	EFH	ROB			
06	VE3BZF	E4H	LLOYD	VADCG	TRS-80	IC-22 S
07	VE3CES	E0H	JOHN		TTY	
08	VE3DI	D6H	ALLAN	G.D.C.	TRS-80	IC-22 S
09	VE3DNM	62H	MAX	VE3DVV	TRS-80	IC-22 S
10	VE3DSP	61H	GLENN	VE3DVV	TRS-80	VTR
11	VE3DVV	73H	JOHN	VE3DVV	CPM	IC-22 S
12	VE3EC	ECH	BILL	VE3EC	CPM	IC-22 S
13	VE3EFD	08H	ROB	VE3MWM	CPM	
14	VE3EHL	75H	ED	VADCG	TH-3216	ST-227
15	W2EUP	77H	GILL	GLB		
16	VE3FAO	FAH	FRANK	VE3FAO	LNW-80	AZDEN-3000
17	VE3FGK	DAH	DAVE	NCR	TRS-80	AZDEN-2000
18	VE3FHJ	EDH	TOM	VADCG	APPLE	IC-211
19	VE3FIV	40/C0H	MIKE	VADCG	VCOM1	TR-7950
20	VE3FMG	78H	MIKE	HYBRID	TRS-80	IC-211
21	VE3FXQ	DFH	LARRY	VADCG	PET	IC-22 S
22	VE3GBC	D8H	BRUCE	VADCG	PET	HW-202
23	VE3HDJ	DEH	DICK		IBM	
24	VE3HGC	D3H	ROGER	VADCG	APPLE	IC-22 S
25	VE3HYN	84H	CRAIG			
26	VE3IAC	EEH	PAUL	NCR	LNW-80	HW-2036 A
27	VE3IBH	D5H	JIM	VADCG	APPLE	HW-2036 A
28	VE3IHG	D1H	RON	VADCG	APPLE	IC-22 S
29	VE3IUV	74H	RON	VE3DVV	TRS-80	IC-22 S
30	VE3IXT	85H	JOHN	VADCG		IC-211
31	VE3IYQ	DBH	ED	VADCG	TRS-80	HW-202
32	VE3IZO	D9H	GORD	G.D.C.	APPLE	HW-202
33	VE3JBP	E2H	CHARLIE	VADCG	TRS-80	HW-202
34	VE3KVG	D4H	ROGER	VADCG	APPLE	HW-202
35	VE3LCM	E3H	EARL			
36	VE3LNY	35/B5H	JACK	SANDERS	IBM	IC-22 S
37	VE3MCF	34/B4H	DOUG	VADCG	IBM	AZDEN-2000
38	VE3OBE	C8H	BILL			
39	K2MPE	7CH	AL		TRS-80	
40	VE3MWM	39/B9H	STU	VE3MWM	CPM	TR-2400
41	VE3NEC	D2H	JOHN	VE3NEC	TRS-80	IC-22 S
42	VE3OGY	44/C4H	DOUG	NCR	CPM	IC-22 S
43	VE3PKT	3A/BAH	MAIL	VE3MWM	CPM	ULTRACOM
44	WA2RYT	7AH	RAY		CPM	IC-22 S
45	VE3SP	76H	RON	VADCG	TRS-80	IC-22 S
46	WB2TGU	7BH	TOM		ZX-81	
47	W4UCH	63H	BOB	SOFTWARE		
48	VE3UR	DDH	RAY	VADCG	PET	DRAKE
49	WB2VEU	41/C1H	ANDY	VADCG	VCOM1	TR-7950

REPEATER PROGRAM RPT13

By John C. Vanden Berg,* VE3DVV

(Editor's notes - This article describes the features of the repeater program in use in the Toronto/Hamilton area as well as in the Sydney, Australia area and soon to be operational in other areas. John, VE3DVV is presently working on a new version of this program called 'RPT14' which is in the final testing phase at the present time. The program runs in a VADCG TNC board with the modifications described in another article in this newsletter. This version has given us good service for many months now.)

LAST CHANGED: FEB. 5 1983 (PROGRAMMABLE CTS DELAY)

THIS PROGRAM IS DESIGNED TO RUN IN THE VADCG TERMINAL NODE CONTROLLER. IT DRIVES AN INTEL 8273 HDLC/SDLC PROTOCOL CONTROL CHIP USING INTERRUPTS AND RUNS IN ROM MEMORY. ITS PURPOSE IS TO ECHO ANY FRAME IT RECEIVES CORRECTLY.

THE PROGRAM IS AN EXPANDED VERSION OF VE7APU'S ECHO PROGRAM

THE FOLLOWING ADDITIONS WERE MADE :

1. The default address range it repeats is 60H to FFH.
2. A TOD (time of day) clock has been added.
3. A Julian date calender was added.
4. Three levels of commands have been added :
   level 1. Public
(any station within range using LIPTT protocol)
   level 2. Selected
(any station using control address 88 hex)
   level 3. Operator commands
(selected stations, such as licencee)

5. Repeater failure detection and error handler. (software detected failures are saved and recovered if possible)
6. Error logging. (software detected failures are counted, time and day of last failure saved)
7. Software hooks.
(to allow downloaded code using local interface to be added for further program development.)
8. Downloader/trap program.
(a separate program " RPTRAM.ASM " resident in top of eprom for downloading and debugging)

COMMAND DETAILS :

LEVEL 1 COMMANDS

TIME
; displays current time and message
LOG
; shows log status
LOGON
; station logon request
LOGOFF
; station logoff request
LOG :
; shows log status and cts delay
LOGON :XXX
; logon station and set cts delay

LEVEL 2 COMMANDS

STATUS :
; display current repeater status, such as repeater enabled/disabled, failures etc.
CLEAR :
; clears cca and tx/rx buffer
SAVE :
; save current environment (CCA and buffers)
DUMP :
; dump CCA and buffers

LEVEL 3 COMMANDS

RESET :
; resets repeater
TIME :HH MM SS
; set time of day clock
DAY :XXX
; set Julian date
MSG :(TEXT)
; change broadcast message (transmitted every 5 min)
REPEATER :ON
; enables the repeat function
REPEATER :OFF
; disables the repeat function
DUMP :XXXX-YYYY
; dump any storage area
TABLE :XX
; fills the user logon table
TRAP :
; like SAVE : command, but to a protected area not accessible by level 2 commands.

NOTE : a higher level command also includes all lower level commands.

SHORT SUMMARY :

This repeater allows selected repeats as requested by the packet user (LOGON cr, cr, LOGOFF cr, cr) commands. The turnaround time of the repeater for each address is programmable by the user (Example: LOGON :120 cr cr). The programmable repeater CTS delay ranges from 0 to 630 msecs. A too-short delay will result in missed packets, and too long a delay results in slow throughput.

Anyone who would like to study the format of the actual packets,can change his TNC address to 88 hex and use the " SAVE : " and " DUMP : ",commands to look at the packets as received by the repeater. The " CLEAR : ",command effectively resets the repeater and clears the buffers.

The actual buffer starts at 1070 hex in memory. Below this is the stack pointer and the common communications area (CCA) command to 1800 -1BFF so it can be transmitted by the " DUMP : " command. In other words subtract 800 hex for the real address.

The repeater can be controlled by two control stations. Either station can reset the repeater, turn the repeater on/off remotely, set time of day, Julian date, change 5 min. interval message, dump any part of memory, check for errors, do traps and initialize the user table.

****

PACKET RADIO HOST SUPPORT USING THE IBM PC

By Jack Botner* VE3LNY

It appears as though I was the first person with the IBM Personal Computer to get on packet radio in the Toronto/Hamilton area. Since I had written programs to run RTTY on the PC, I thought I could develop a program to support use of the VADCG Terminal Node Controller, which runs popular, locally developed terminal interface programs (TIPs). This article is a description of the resulting program.

Actually, two programs were developed. The first program, named PKT2, was written to support the AMRAD TIP, which is what I used when I first got on packet radio. Later, PKT2 evolved into the second program, PKT4, which supports the local VE3DSP TIP, which I am now using. The two programs are similar, the main difference being the way escape sequences are implemented in the two TIPs.

Briefly, the AMRAD TIP uses the Data Link Escape character, hex-10, to initiate an escape sequence, whereas the VE3DSP TIP uses the regular escape character, hex-27, for that purpose. The command set and the command characters are different for the two TIPs. And the AMRAD TIP releases frames automatically after a carriage-return linefeed sequence, whereas the VE3DSP TIP requires a frame release command.

Both PKT2 and PKT4 will run only under release 2.0 (or higher) of PC-DOS. This is because of the command processor feature, which allows you to execute other programs while PKT2/4 is running. This feature uses facilities new in PC-DOS 2.0.

HARDWARE REQUIREMENTS

To run PKT2 or PKT4, the PC must have 96K of main storage and one diskette drive. The PC communicates with the TNC via the standard asynchronous communications adapter feature card. The card may be configured as either COM1 or COM2. (This adapter was known as AUX in earlier releases of PC-DOS.)

COMMUNICATIONS SUPPORT FIRMWARE

Support for the communications adapter card in the PC is not contained in PKT2/4, but in a separate program called COMSRV. COMSRV may be thought of as a replacement of the PC-DOS and ROM BIOS routines which support COM1 and COM2, in order to provide the higher level of function needed for packet radio.

COMSRV consists of the following components:

1. Hardware interrupt handling vector 0C (hex) to process IRQ4 interrupts from COM1;
2. Hardware interrupt handling vector 0B (hex) to process IRQ3 interrupts from COM2;
3. Software interrupt handling vector 70 (hex) to provide a program service interface for COM1/2 requests;
4. A bootstrap loader to install the routines and buffers when COMSRV is first executed.

The last point suggests that COMSRV is run as a program once, prior to running PKT2 or PKT4, to reserve storage for receive buffers and to load the necessary interrupt handling routines into storage. Frequent users of PKT2/4 will want to run COMSRV at system IPL time, so that it is available whenever PKT2 or PKT4 is run. This can be conveniently done by including COMSRV in the AUTOEXEC.BAT file on the IPL diskette.

Programs such as PKT2 and PKT4 communicate with and use the services of COMSRV by issuing software interrupt calls, INT 70H. Services are provided to initialize and terminate use of COM1 or COM2, and to read and write data. Received data is placed in a large buffer, so that it can remain unread for a considerable length of time before data is lost due to buffer overflow.

The buffer for COM1 is 4096 bytes, and the buffer for COM2 is 512 bytes. This configuration favors the use of COM1 for packet radio, although it will certainly work with COM2 as well. Those intending to use COM2 rather than COM1 for packet radio should reverse the buffer size definitions and re-compile COMSRV (see below). The purpose of this is to avoid reserving storage which will not be utilized.

THEORY OF OPERATION

Programs using the services of COMSRV first issue an "open" request for COM1 or COM2. This, among other things, causes the corresponding hardware interrupt routine (IRQ3 or IRQ4) to be enabled for receive data. From this point until a "close" is issued, received data is placed in one of the buffers in COMSRV, driven by hardware interrupt.

This processing will continue even if the program issuing the open is terminated, as long as it does not issue a close. This means that data can continue to be received while the packet program is not running. With the exception of Basic (compiled or interpreter) programs, any other program can be run on the PC. Then, the packet program can be run again, which will then read in the data buffered in the interim.

Basic programs will disrupt this operation. Why? Because Basic installs its own IRQ3 and IRQ4 interrupt handling routines, without regard to whether someone is already making use of one or both of these vectors, or if the program actually needs COM1 or COM2. This fact is unfortunate and there is not much that can be done about it. If you need to run a Basic program, terminate the packet program using the END function key.

What happens to the received data while the packet program is not running? It is stored in one of the buffers in COMSRV. When 4he buffer capacity is exceeded, the oldest data is overwritten by newly arrived data,

so that the most recent data is available when it is finally read. In order to store more data, the buffer in COMSRV could be made larger if desired. You get no indication that an overrun has occurred, but the buffer is so large that under normal operation overruns do not happen. Overruns will only occur when PKT2/4 is not running or the scroll locks on for a period of time.

When initiated, both PKT2 and PKT4 automatically bypass the open to COMSRV when it is already active (i.e. an open had been issued but no close). A user option is provided to optionally bypass the close processing when terminating PKT2/4. This means that the program can be run and terminated any number of times, while continuing to receive data from the TNC.

PKT2/4 FUNCTIONAL DESCRIPTION

PKT2 and 4 provide the following functions:

1. Receive incoming data from the TNC and display it on the screen.

2. Allow data to be typed at the keyboard and sent to the TNC.

3. Provide a way to capture data and store it on diskette.

4. Send binary or ASCII files from diskette.

5. Operating conveniences
   a) A function key which places a test message containing the date, time and station call in the keyboard input area
   b) A function key which places the last message sent to the TNC back in the keyboard input area
   c) A function key that turns internal echo on or off
   d) Display of lock key statuses on the screen
   e) Ability to suspend scrolling on the screen using the Scroll Lock key
   f) Ability to invoke other programs to run under PKT2/4.

6. The programs always respond to the keyboard. It is not possible to be locked out of the system in an indefinite wait.

7. Data may continue to be received even when the program is not running.

CONCLUSION

In conclusion, I have developed programs for the IBM PC which provide a full range of function to the TNC user. This was made possible in part by the large main storage capacity of the PC, and the ease of writing interrupt handlers to control the hardware thus relieving the application program of the burden of polling communications devices.

The programs described in this article are available from the author, for no cost other than postage and distribution media, under the condition that they be used by licensed amateur radio operators for amateur radio purposes only. Under no circumstances may these programs be sold or otherwise used commercially or for profit.

Jack Botner, VE3LNY
35 Wynford Hts. Cr. #1708
Don Mills, Ontario
Canada M3C 1L1
416-449-0967

****

VADCG DONATES TNC FOR USE AS REPEATER

The VADCG has generously donated an assembled TNC to the HAPN for use as a second repeater to be used for a digital repeater linking project in the Toronto-Hamilton area. It is expected that this repeater will be set up at some location east of Toronto to provide the needed link between the digital repeater being relocated to the Erin Mills site and the digital repeater in the Rochester, New York area. When the software is written to make these three repeaters operate successfully in a linked network, we should be able to have reliable communication between packeteers in the Hamilton, Toronto, Buffalo and Rochester areas. See an article on the linking project elsewhere in this newsletter for further information.

****

TNC AND MODEM AVAILABILITY

Since the last newsletter the VADCG has reduced the price on its TNC board to $22 Canadian and $19.95 U.S. The previous prices were $32 and $30 respectively. The parts kit for the TNC board is still the same price but now comes with a full complement of memory.

At the present time all of the boards and kits are available and can be shipped usually within 24 hours of receiving an order. Address any orders to the VADCG's new address:

VADCG
9531 Odlin Road
Richmond, B.C. V6X 1E1

The current prices* are:

$CAN	$US	
199	169	for assembled and tested TNC. (Does not include power supply or cabinet.)
157	136	for complete TNC Kit for serial (RS232) connection. Includes PC board, all 8K of memory, all components are socketed. (Does not include power supply or cabinet.)
135	117	for same as above less PC board
22	19.95	for TNC bare PC board only
15	15	202-type 1200 Baud modem bare PC board only.
80	70	for 202-type 1200 Baud modem assembled and tested.
50	44	for Intel 8273 chip

* Shipped postpaid in the U.S. and Canada